

# An Introduction to MOVES: Output Processing

FHWA Resource Center  
EPA Office of Transportation and Air Quality



EPA-420-B-09-024

## Output Presentation Outline

- An exploration of output results.
- Post-Processing Menu
  - Summary Report.
  - MySQL Scripts.
  - State/County Map.
- Feel free to ask questions!

## MOVES Output

- All of the results of a MOVES run are stored in MySQL database tables.
- These results can be accessed by:
  - Using MOVES post-processing tools.
  - Using MySQL query commands.
  - Using the MySQL Query Browser software.
  - Using Microsoft Access with a MySQL ODBC.
- Any table may be exported to other applications (i.e., MS Excel) for further processing.

## Output Tables

- MOVESOutput – Contains the emission results.
- MOVESActivityoutput – Contains the distance.
- MOVESRun - Information about the run.
- **Emission Rate Output:**
  - MOVESLookupOutput
  - MOVESLookupActivityOutputTemp
- **Diagnostic Tables:**
  - ActivityType, MOVESError, MOVESTablesUsed, MOVESWorkersUsed and MOVESEventLog tables are used for run diagnostics.

# Output Tables

The screenshot shows the MySQL Query Browser interface. The query executed is `SELECT * FROM lake_mo . movesrun ;`. The result set, labeled 'Resultset 1', contains one row with the following data:

MOVESRunID	outputTimePeriod	timeUnits	distanceUnits	mass
1	Hour	hour	mi	g

The right-hand pane displays the 'Schemata' tree, showing the database structure. The 'lake\_mo' database is expanded, revealing several tables including 'activitytype', 'movesactivityoutput', 'moveserror', 'moveseventlog', 'moveslookupactivityoutput', 'moveslookupoutputtemp', 'movesoutput', 'movesrun', 'movesused', 'movesusedused', and 'movesworkused'. Below the schema tree is a 'Syntax' pane with tabs for 'Functions', 'Params', and 'Trx', containing a list of SQL statement categories.

## **MOVESOutput Table**

- MOVESRunID
- iterationID
- yearID
- monthID
- dayID
- hourID
- stateID
- countyID
- zoneID
- linkID
- pollutantID
- processID
- sourceTypeID
- fuelTypeID
- modelYearID
- roadTypeID
- SCC
- emissionQuant
- emissionQuantMean
- emissionQuantSigma

## **MOVESActivityOutput Table**

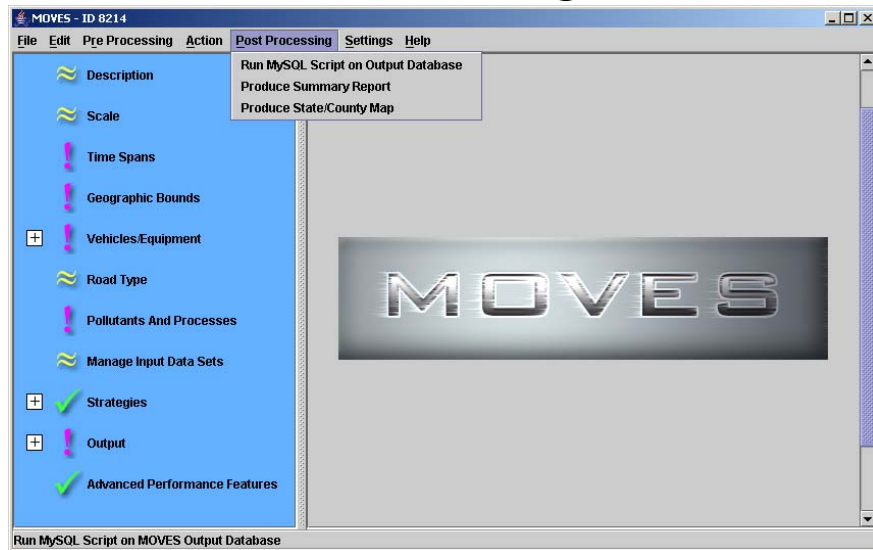
- MOVESRunID
- iterationID
- yearID
- monthID
- dayID
- hourID
- stateID
- countyID
- zoneID
- linkID
- sourceTypeID
- fuelTypeID
- modelYearID
- roadTypeID
- SCC
- activityTypeID
- activity
- activityMean
- activitySigma

## **MOVESRun Table**

- **MOVESRunID**
- **outputTimePeriod**
- **timeUnits**
- **distanceUnits**
- **massUnits**
- **energyUnits**
- **runSpecFileName**
- **runSpecDescription**
- **runSpecFileDateTime**
- **runDateTime**
- **Scale**
- **minutesDuration**
- **defaultDatabaseUsed**
- **masterVersionDate**
- **masterComputerID**
- **domain**
- **domainCountyID**
- **domainCountyName**
- **domainDatabaseServer**
- **domainDatabaseName**



# Post-Processing Menu



## Post-Processing Menu

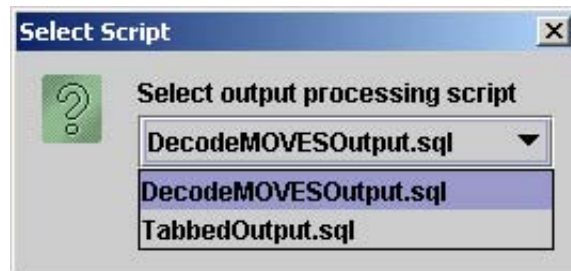
- Use this menu once you have results.
- You select an existing output database using the runspec used to generate the results.
- Options for processing output include:
  - Execute existing MySQL scripts.
  - Summarize results into text files.
  - Graphically represent results in a county map.

# Post-Processing Scripts



11

# Post-Processing Scripts

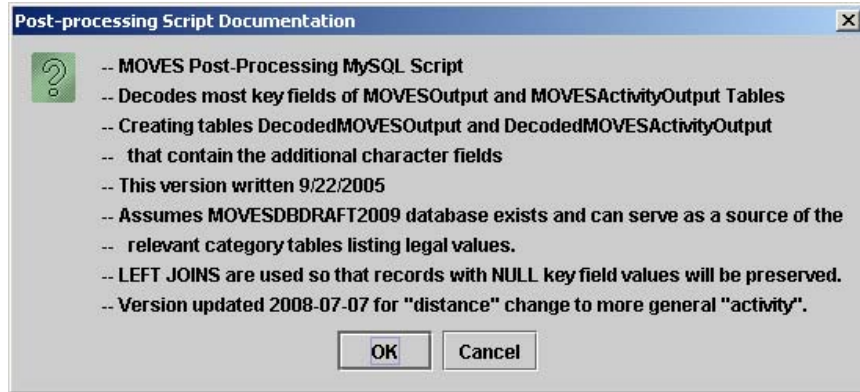


12

## Post-Processing Scripts

- The scripts are applied to the latest RunID in the current output database selected by the runspec.
- You can select previous runs from the database using the MOVES Run Error Log window from the pull down Action menu.
- These are simply MySQL command scripts stored in the /database/OutputProcessingScripts folder of the MOVES application installation.
- Users may write their own scripts and add them to the folder or add scripts obtained from other users.

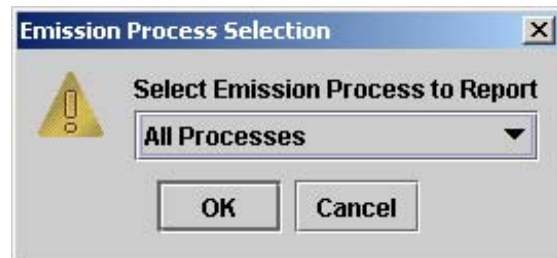
# Decode MOVES Output Script



## Post-Processing Scripts- Warning!

- **Read the script documentation!**
  - Scripts may require that you run MOVES in a particular way.
  - Scripts may require specific units.
- **As we get more experience with using MOVES, new scripts will likely be written.**
- **Do you have ideas for useful scripts? Send them to [mobile@epa.gov](mailto:mobile@epa.gov).**

# Produce Summary Report





## Summary Report

- You select the database you wish to summarize using the runspec.
- Select which process you wish to summarize.

# Summary Report

**Specify Parameters for Summary Report**

**Specify Report for Emission Process: Total of All**

Report Title:

Report File Name:

Run Number(s)	Order/Choose Categories	Data Items
Run: 1 Time: 2008-11-29 16:14:50 OrangeCounty	roadTypeID	Distance
	modelYearID	Oxides of Nitrogen
	stateID	
	yearID	
	monthID	
	dayID	
	hourID	
	countyID	
	sourceTypeID	
	fuelTypeID	
	MOVESRunID	

☒ Display on Screen ☒ Produce tabbed output

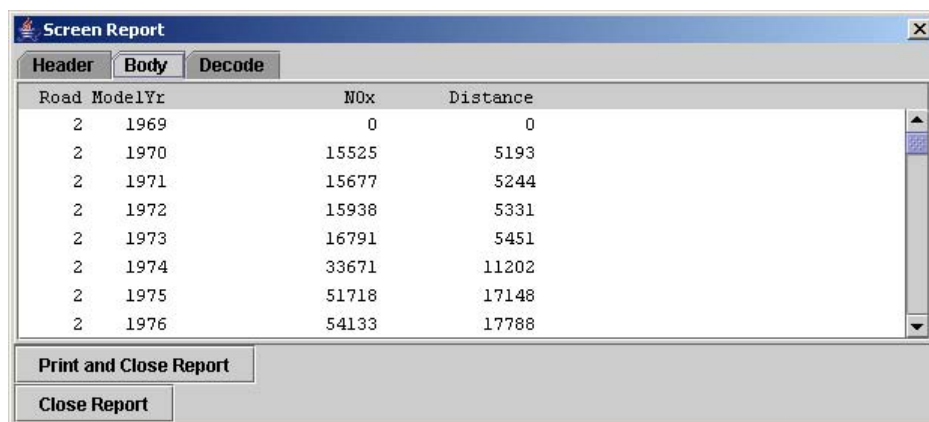
55 Columns

18

## Summary Report

- Name Summary Report Table and File
- Choose the Run from the list available in the database.
- Choose the categories of the summary and their order.
- Choose the pollutants included in the summary.
- Display on screen and/or text file output.
- Estimate column width for text file.
- Results will also be stored in a MySQL table in the output database for the runspec.

# Summary Report: Body



The screenshot shows a software window titled "Screen Report" with a close button (X) in the top right corner. The window contains a table with four columns: "Road", "ModelYr", "NOx", and "Distance". The table has eight rows of data. Below the table, there are two buttons: "Print and Close Report" and "Close Report".

Road	ModelYr	NOx	Distance
2	1969	0	0
2	1970	15525	5193
2	1971	15677	5244
2	1972	15938	5331
2	1973	16791	5451
2	1974	33671	11202
2	1975	51718	17148
2	1976	54133	17788

## Summary Report Body

- Sums the pollutants you selected into the categories you specified.
- Note that the road type categories are indicated by their numeric codes.

# Summary Report: Header

Run	Header Item	Item Value
	Report Title:	Summary Report
	Report Date/Time:	2008-11-29 18:13:3
	MOVES Output Database:	orangecounty_mo
	Emission Process:	All
1	Run Date/Time:	2008-11-29 16:14:50
1	Run Specification:	OrangeCounty
1	Run Spec File Date/Time:	2008-11-29 16:14:38
1	Run Spec Description:	Chapel Hill, Orange County 1999 This is only a test.
1	Mass Units:	g
1	Energy Units:	J
1	Distance Units:	mi
1	Time Units:	hour

Print and Close Report

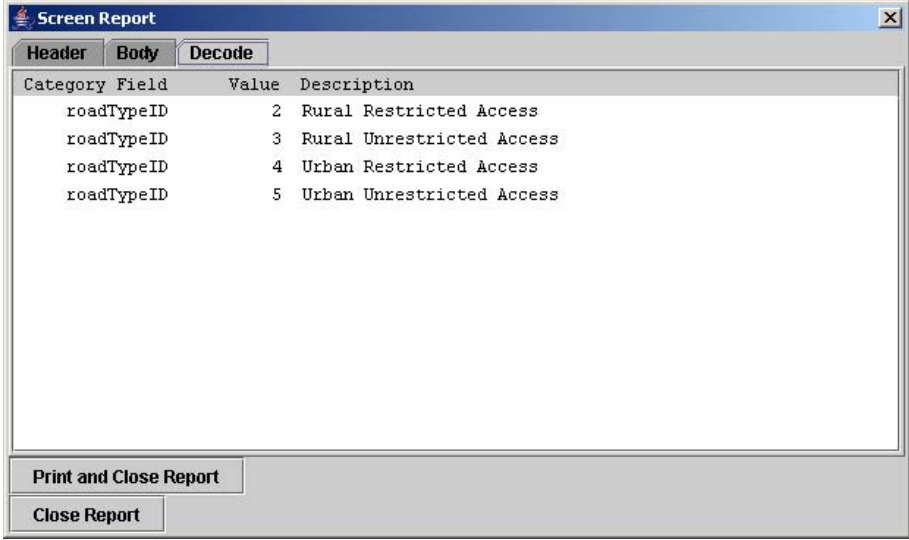
Close Report

22

## Summary Report: Header

- **The header information shows you information about the summary results including:**
  - The units of the values.
  - The run ID and database from which the data was taken.
  - The description of the run you put in the runspec.
  - The date and time the report was generated.

# Summary Report: Decode



The screenshot shows a software window titled "Screen Report" with a close button (X) in the top right corner. Inside the window, there are three tabs: "Header", "Body", and "Decode". The "Decode" tab is currently selected. It contains a table with four columns: "Category", "Field", "Value", and "Description". The table lists four entries for "roadTypeID" with values 2, 3, 4, and 5, corresponding to "Rural Restricted Access", "Rural Unrestricted Access", "Urban Restricted Access", and "Urban Unrestricted Access" respectively. At the bottom of the window, there are two buttons: "Print and Close Report" and "Close Report".

Category	Field	Value	Description
	roadTypeID	2	Rural Restricted Access
	roadTypeID	3	Rural Unrestricted Access
	roadTypeID	4	Urban Restricted Access
	roadTypeID	5	Urban Unrestricted Access

Print and Close Report

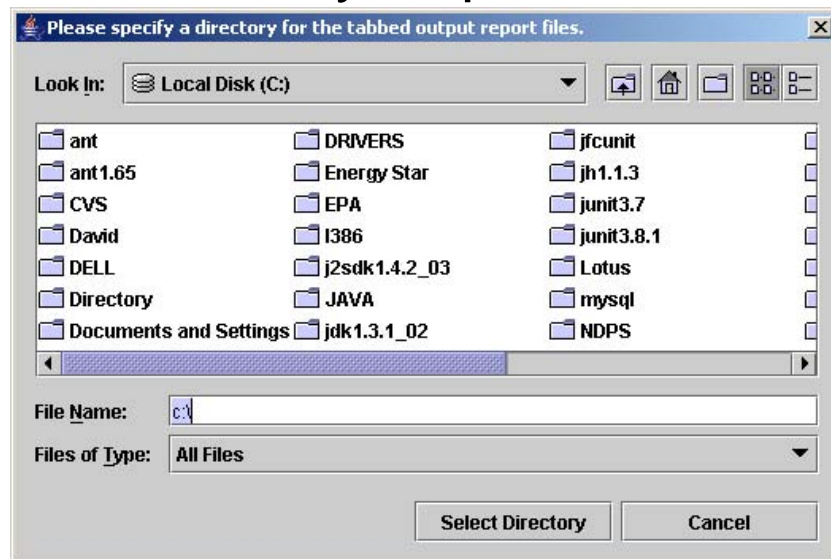
Close Report



## Summary Report: Decode

- The decode tab will show descriptive text for most of the numeric codes used in the body of the report.

# Summary Report: Save



26

## Summary Report: Save

- If you chose to save tabbed output, you will be prompted for a location to place the files generated by the Summary Report.
- Three files will be written:
  - SummaryReportBody.tab
  - SummaryReportHeader.tab
  - SummaryReportDecode.tab
- These text files can be opened by any word processor or spreadsheet application.

## Summary Report Features

- You can produce multiple summary reports from the same database by using different names.
- The Summary Report can be used to aggregate the more detailed results.
- Allows the user to specify a more detailed output in the Output Emissions Detail and produce multiple reports with varying level of detail from the same run.

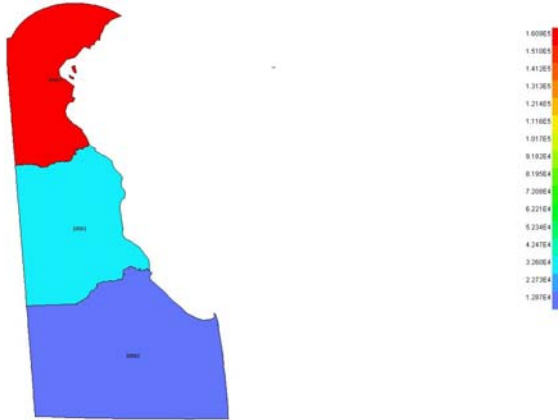
## Generate State/County Map

- Used to create a graphical representation of the data.
- The result table selected:
  - Must contain results by county (include county ID values).
  - Must contain only one row for each county.
- Result tables can be created using the Summary Report.
- The database containing the table is selected using the run specification.

29

We are not demonstrating this feature.

## MOVES Map Example - Delaware



## Other Post-Processing

- Export the data using the MySQL script.
- Export the data using the MySQL Browser.
  - CSV
  - MS Excel
  - PLIST
- Use the data from MS Access using the ODBC.

## MySQL Query Browser

MySQL Query Browser - @localhost:3306 / MOVESDB20070412

File Edit View Query Script Tools Window Help

Go back Next Refresh

SELECT \* FROM avgSpeedBin;

Execute Stop

Resultset 1

	avgSpeedBin	avgBinSpeed	avgSpeedBinDesc
1	2.5	2.5mph	speed < 2.5mph
2	5	2.5mph <= speed < 7.5mph	
3	10	7.5mph <= speed < 12.5mph	
4	15	12.5mph <= speed < 17.5mph	
5	20	17.5mph <= speed < 22.5mph	
6	25	22.5mph <= speed < 27.5mph	
7	30	27.5mph <= speed < 32.5mph	
8	35	32.5mph <= speed < 37.5mph	
9	40	37.5mph <= speed < 42.5mph	
10	45	42.5mph <= speed < 47.5mph	
11	50	47.5mph <= speed < 52.5mph	
12	55	52.5mph <= speed < 57.5mph	
13	60	57.5mph <= speed < 62.5mph	
14	65	62.5mph <= speed < 67.5mph	
15	70	67.5mph <= speed < 72.5mph	
16	75	72.5mph <= speed	

16 rows fetched in 0.0066s (0.0003s)

Edit Apply Changes Discard Changes First Last Search

Schemata Bookmarks History

lookuprun1.tst

MOVESDB20070412

- agecategory
- agegroup
- averagetankgasoline
- averagetanktemperature
- avgSpeedBin
- avgSpeedDistribution
- coldsoakinitialhourfraction
- coldsoaktanktemperature

Syntax Functions Params Trx

Data Manipulation

- DELETE
- DO
- HANDLER
- INSERT
- LOAD DATA INFILE
- REPLACE
- SELECT
- Subquery
- TRUNCATE
- UPDATE



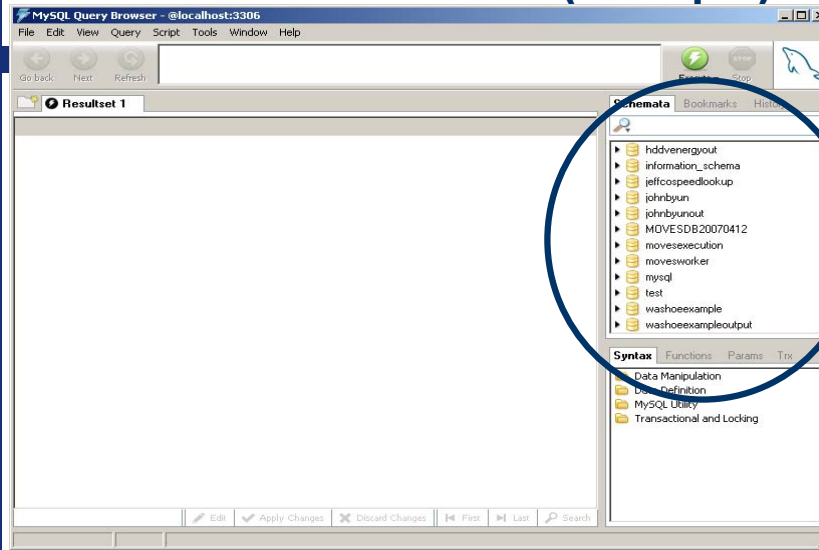
## MySQL Query Browser

- Provided with the MOVES model
- Windows tool for viewing databases, executing queries, and editing tables
- Resultsets can be exported as csv or Excel files
- Built-in Help files
- Records query history, so you can repeat queries without retyping them
- Tables can be edited directly, rather than using MySQL commands
  - Table must have a key to be edited directly

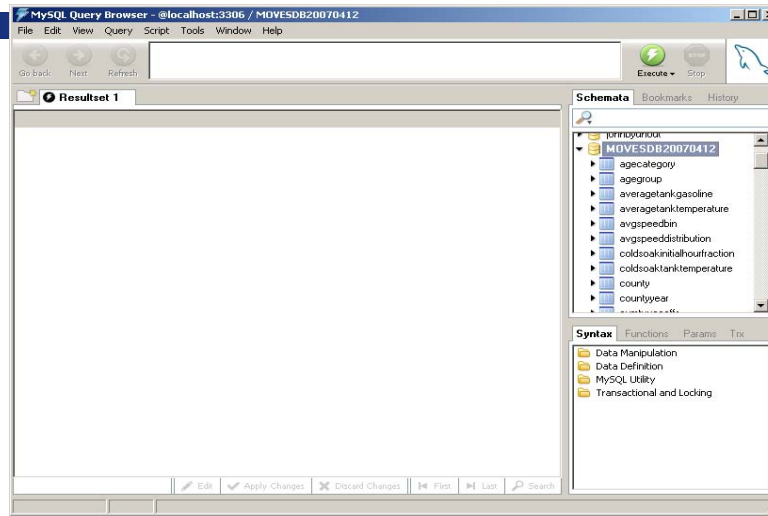
## Exploring MOVES Databases with Query Browser

- **We'll demonstrate some simple MySQL commands in Query Browser**
  - Commands are shown in the slide headings and screenshots
  - Note that some screenshots show older versions of MOVES and/or output databases you won't have on your computer
- **To Open Query Browser (don't need to do this now):**
  - Start/Programs/MySQL/MySQL Query Browser
  - Make sure "localhost" is specified (might not be after initial installation) and click OK
    - Click "ignore" on warning message about schema
    - You can suppress this message for future use

## MySQL Query Browser opening view with available databases (example)



## Double-clicking on the MOVES default database opens up tables



36